

WHAT IS CLAIMED IS:

1. A method of closing a patent foramen ovale having a septum primum and a septum secundum, comprising:

5 providing a closure device having a proximal end, a distal end, a proximal segment, an intermediate segment and a distal segment, the proximal and intermediate segments defining a first clip-shaped portion and the intermediate and distal segments defining a second clip-shaped portion; and

10 deploying the closure device within the patent foramen ovale such that the second clip-shaped portion is positioned over a tip of the septum primum and the first clip-shaped portion is positioned over a tip of the septum secundum, with the intermediate portion lying in a channel between the septum primum and the septum secundum;

wherein the closure device when deployed exerts a force to draw the septum primum and septum secundum together.

15 2. The method of Claim 1, wherein the intermediate and distal segments of the closure device when deployed are positioned along surfaces of the septum primum and the proximal and intermediate segments of the closure device when deployed are positioned along surfaces of the septum secundum.

20 3. The method of Claim 1, wherein the first clip-shaped portion and second clip-shaped portions are integrally formed.

4. The method of Claim 1, wherein the first clip-shaped portion and second clip-shaped portions are made of wire.

5. The method of Claim 1, wherein the first clip-shaped portion and second clip-shaped portions when the device is deployed forms generally an S-shape.

25 6. The method of Claim 1, wherein each clip-shaped portion is formed from two adjacent loops connected by a connecting portion.

7. The method of Claim 1, wherein deploying the closure device comprises releasing the closure device from a detachment element provided on the device.

30 8. The method of Claim 1, further comprising locking the position of the device after deployment.

9. The method of Claim 1, wherein the device self-expands to its deployment configuration.

10. A method of closing a patent foramen ovale having a septum primum and a septum secundum, comprising:

providing a closure device having a proximal end and a distal end and having a generally elongate configuration and a clip configuration, wherein when  
5 the device is in its elongate configuration the proximal and distal ends are pulled away from each other and when the device is in its clip configuration the device has generally an S-shape,

releasably attaching the device relative to a delivery device;

10 delivering the closure device to the patent foramen ovale with the delivery device, the closure device being held relative to the delivery device in its elongate configuration; and

deploying the closure device in the patent foramen ovale, wherein the device when deployed includes a first clip-shaped portion positioned around the septum secundum and a second clip-shaped portion positioned around the septum primum.

15 11. The method of Claim 10, wherein the closure device includes a detachment element at its proximal end, and the device is delivered using a core wire that releasably engages the detachment element.

12. The method of Claim 10, wherein the device is held in its elongate configuration distal to a deployment catheter.

20 13. The method of Claim 10, wherein the device is delivered by positioning the catheter between the septum primum and septum secundum.

14. The method of Claim 10, further comprising locking the device in its clip configuration after deployment.

25 15. The method of Claim 10, wherein the device self-expands to its deployment configuration.

16. The method of Claim 10, wherein the device includes a plurality of eyelets, and the device is releasably attached to a delivery device by engaging a core through at least some of the eyelets.

30 17. A device for closing a patent foramen ovale, comprising:  
a proximal end and a distal end;  
a proximal segment, an intermediate segment and a distal segment, wherein each of the segments is sequentially aligned;

wherein the device has a generally elongate configuration and a clip configuration, the device when in its elongate configuration pulls the proximal and distal ends away from each other such that the proximal segment, intermediate segment and distal segment become relatively more linear, and the device when in its clip configuration draws the proximal segment and intermediate segment into a first clip-shaped portion sized and configured to be positioned over a septum secundum of the patent foramen ovale, and draws the intermediate segment and distal segment into a second clip-shaped portion sized and configured to be positioned over a septum primum of the patent foramen ovale.

18. The closure device of Claim 17, wherein the device in its clip configuration generally has an S-shape.

19. The closure device of Claim 17, wherein the device includes a locking element to lock the device in its clip configuration.

20. The closure device of Claim 17, wherein the device is self-expanding.

21. The closure device of Claim 20, wherein when the device in an unstressed configuration, the proximal, intermediate and distal segments are substantially parallel to one another.

22. The closure device of Claim 17, wherein the device is made of a wire.

23. The closure device of Claim 22, wherein the proximal segment, intermediate segment and distal segment are formed from the same wire.

24. The closure device of Claim 17, wherein the device includes a detachment element for releasably attaching the device to a delivery device.

25. The closure device of Claim 17, wherein the proximal segment is loop shaped.

26. The closure device of Claim 17, wherein the proximal segment is rectangular shaped.

27. The closure device of Claim 17, wherein the proximal segment is hexagonally shaped.

28. The closure device of Claim 17, wherein the device includes a plurality of eyelets sized and configured to receive a delivery device.

29. The closure device of Claim 17, wherein the proximal and distal segments have identical shapes that form mirror images of each other across the patent foramen ovale to equally apply compressive force to both sides of the patent foramen ovale.

30. The closure device of Claim 17, wherein the proximal segment has a larger  
5 dimension than the distal segment.

31. The closure device of Claim 17, wherein the device includes a plurality of tissue anchors.

32. A closure device for closing a patent foramen ovale, comprising:  
a proximal end, a distal end, a proximal segment, a distal segment, and an  
10 intermediate segment, wherein the device has a generally elongate configuration and a clip configuration, the device when in its elongate configuration pulls the proximal and distal ends away from each other such that the proximal segment, intermediate segment and distal segment become relatively more linear, and the device when in its clip configuration draws the proximal segment and intermediate  
15 segment into a first clip-shaped portion sized and configured to be positioned over a septum secundum of the patent foramen ovale, and draws the intermediate and distal segment into a second clip-shaped portion sized and configured to be positioned over a septum primum of the patent foramen ovale; and

a covering provided on at least one of the segments of the device.  
20 33. The closure device of Claim 32, wherein the proximal segment, distal segment and intermediate segment are integrally formed.

34. The closure device of Claim 33, wherein the proximal segment, distal segment and intermediate segment are integrally formed from a wire structure.

35. The closure device of Claim 32, wherein the covering is a sleeve provided  
25 over the intermediate segment and is adapted to be positioned in a tunnel of the patent foramen ovale.

36. The closure device of Claim 32, wherein the covering is a laminate structure provided over at least the proximal segment of the device.

37. The closure device of Claim 32, wherein the covering is made of ePTFE.

30 38. A device for closing a patent foramen ovale, comprising:  
a proximal end and a distal end;  
a proximal segment and a distal segment;

wherein the device has generally a hook configuration wherein the distal segment is sized and configured to be positioned over a septum primum of the patent foramen ovale, and the proximal segment is sized and configured to extend through a tunnel of the patent foramen ovale with its proximal end positioned in the right atrium.

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39. The closure device of Claim 38, wherein the proximal and distal segments are integrally formed.

40. The closure device of Claim 38, wherein the proximal segment has an increased width toward its proximal end to secure the closure device in the right atrium against the septum primum.

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41. A system for delivering a closure device to a patent foramen ovale, comprising:

a deployment catheter having a proximal end and a distal end;

an actuator extending through the deployment catheter; and

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a closure device releasably attached to the actuator, wherein the actuator is adapted to advance the closure device from the distal end of the deployment catheter and position a distal segment of the closure device over a septum primum of the patent foramen ovale and position a proximal segment of the closure device over a septum secundum of the patent foramen ovale, the closure device being actuatable to pinch together the septum primum and septum secundum once delivered.

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42. The system of Claim 41, wherein the closure device includes eyelets releasably attached to the actuator.

43. The system of Claim 41, wherein the closure device is threadingly engaged with the actuator.

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44. The system of Claim 43, wherein the actuator is threadingly engaged to a proximal end of the closure device.

45. The system of Claim 43, wherein the actuator is threadingly engaged to a distal end of the closure device.

46. The system of Claim 41, wherein the closure device is self-expanding.

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47. The system of Claim 41, further comprising a tether line releasably attached to the closure device.